

WHAT IS CLAIMED IS:

1. An image reading apparatus for moving a document reading unit to a point below a document feeder that feeds documents, and emitting light from a light source
5 of the document reading unit toward a feed roller of the document feeder, whereby light reflected from a document that travels between the feed roller and the light source is sensed by the document reading unit to thereby read an image on the document, said apparatus
10 comprising:
 - a photoelectronic converter for outputting an electric signal that conforms to amount of incident light; and
 - a reading position setting unit adapted to move the
15 document reading unit, irradiate the feed roller with light from the light source at each position to which the document reading unit is moved, cause said photoelectronic converter to output an electric signal that conforms to amount of light reflected from the feed
20 roller at each position, detect a range in a sub-scan direction over which this electric signal exceeds a predetermined threshold value, and set a position at the center of this range as a reading position.
2. The apparatus according to claim 1, wherein said
25 reading position setting unit decides the threshold value based upon a maximum value of the electric signal output by said photoelectronic converter.

3. The apparatus according to claim 2, wherein said reading position setting unit adopts a value, which is obtained by multiplying the maximum value of the electric signal output by said photoelectronic converter by a predetermined coefficient, as the threshold value.

4. The apparatus according to claim 2, wherein said reading position setting unit decides the threshold value based upon the maximum value of the electric signal, which is output by said photoelectronic converter, when said maximum value is greater than a predetermined value.

5. The apparatus according to claim 4, wherein said reading position setting unit outputs an error signal when the maximum value of the electric signal output by said photoelectronic converter is equal to or less than the predetermined value.

6. The apparatus according to claim 1, wherein said reading position setting unit sets the reading position when the range in the sub-scan direction over which the predetermined threshold value is exceeded is broader than a predetermined range.

7. The apparatus according to claim 6, wherein said reading position setting unit outputs an error signal when the range in the sub-scan direction over which the predetermined threshold value is exceeded is narrower than the predetermined range.

8. The apparatus according to claim 1, wherein said

reading position setting unit controls to perform a pre-processing of moving said document reading unit, causing the photoelectric converter to output an electric signal at each position to which the document reading unit is moved, and detecting a position in the sub-scan direction that corresponds to the maximum value of this electric signal, and to execute processing for setting the reading position with regard to a predetermined range the center of which is the position in the sub-scan direction obtained in the pre-processing.

9. An image reading apparatus for moving a document reading unit to a point below a document feeder that feeds documents, and emitting light from a light source of the document reading unit toward a feed roller of the document feeder, whereby light reflected from a document that travels between the feed roller and the light source is sensed by the document reading unit to thereby read an image on the document, said apparatus comprising:

a photoelectric converter for outputting an electric signal that conforms to amount of incident light; and

a reading position setting unit adapted to move the document reading unit, irradiating the feed roller with light from the light source at each position to which the document reading unit is moved, cause said photoelectric converter to output an electric signal

that conforms to amount of light reflected from the feed roller at each position, detect a range in a sub-scan direction over which this electric signal exceeds a predetermined threshold value, detect a flat portion of the read signal within this range, and set the center of the detected flat portion as a reading position.

10. The apparatus according to claim 9, wherein said reading position setting unit decides the threshold value based upon a maximum value of the electric signal output by said photoelectronic converter.

11. The apparatus according to claim 10, wherein said reading position setting unit adopts a value, which is obtained by multiplying the maximum value of the electric signal output by said photoelectronic converter by a predetermined coefficient, as the threshold value.

12. The apparatus according to claim 10, wherein said reading position setting unit decides the threshold value based upon the maximum value of the electric signal, which is output by said photoelectronic converter, when said maximum value is greater than a predetermined value.

13. The apparatus according to claim 12, wherein said reading position setting unit outputs an error signal when the maximum value of the electric signal output by said photoelectronic converter is equal to or less than the predetermined value.

14. The apparatus according to claim 9, wherein said

reading position setting unit sets the reading position when the range in the sub-scan direction over which the predetermined threshold value is exceeded is broader than a predetermined range.

5 15. The apparatus according to claim 14, wherein said reading position setting unit outputs an error signal when the range in the sub-scan direction over which the predetermined threshold value is exceeded is narrower than the predetermined range.

10 16. The apparatus according to claim 9, wherein said reading position setting unit controls to perform a pre-processing of moving said document reading unit, causing the photoelectronic converter to output an electric signal at each position to which the document reading unit is moved, and detecting a position in the sub-scan direction that corresponds to the maximum value of this electric signal, and to execute processing for setting the reading position with regard to a predetermined range the center of which is the position in the sub-scan direction obtained in the pre-processing.

15 17. A reading position setting method in an image reading apparatus for moving a document reading unit to a point below a document feeder that feeds documents, and emitting light from a light source of the document reading unit toward a feed roller of the document feeder, whereby light reflected from a document that travels between the feed roller and the light source is

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converted to an electric signal by a photoelectronic converter to thereby read an image on the document, said method comprising:

5 a read-out step of moving the document reading unit, irradiating the feed roller with light from the light source at each position to which the document reading unit is moved and causing said photoelectronic converter to output an electric signal that conforms to amount of light reflected from the feed roller at each
10 position;

a detection step of detecting a range in a sub-scan direction over which the electric signal exceeds a predetermined threshold value; and

15 a setting step of setting a position at the center of the range, which has been detected at said detection step, as a reading position.

18. The method according to claim 17, wherein the threshold value is decided based upon a maximum value of the electric signal output by the photoelectronic
20 converter.

19. The method according to claim 18, wherein a value, which is obtained by multiplying the maximum value of the electric signal output by the photoelectronic converter by a predetermined coefficient, is adopted as
25 the threshold value.

20. The method according to claim 18, wherein the threshold value is decided based upon the maximum value

of the electric signal, which is output by the photoelectronic converter, when said maximum value is greater than a predetermined value.

21. The method according to claim 20, further
5 comprising a step of outputting an error signal when the maximum value of the electric signal output by the photoelectronic converter is equal to or less than the predetermined value.

22. The method according to claim 17, wherein the
10 reading position is set at said setting step when the range in the sub-scan direction over which the predetermined threshold value is exceeded is broader than a predetermined range.

23. The method according to claim 22, further
15 comprising a step of outputting an error signal when the range in the sub-scan direction over which the predetermined threshold value is exceeded is narrower than the predetermined range.

24. The method according to claim 17, further
20 comprising the following steps executed before said read-out step:

a step of moving said document reading unit and causing the photoelectronic converter to output an electric signal at each position to which the document
25 reading unit is moved; and

a step of detecting a position in the sub-scan direction that corresponds to the maximum value of this

electric signal;

wherein processing is executed at said read-out step with regard to a predetermined range the center of which is the obtained position in the sub-scan

5 direction.

25. A reading position setting method in an image reading apparatus for moving a document reading unit to a point below a document feeder that feeds documents, and emitting light from a light source of the document
10 reading unit toward a feed roller of the document feeder, whereby light reflected from a document that travels between the feed roller and the light source is converted to an electric signal by a photoelectronic converter to thereby read an image on the document, said
15 method comprising:

a read-out step of moving the document reading unit, irradiating the feed roller with light from the light source at each position to which the document reading unit is moved and causing said photoelectronic
20 converter to output an electric signal that conforms to amount of light reflected from the feed roller at each position;

a first detection step of detecting a range in a sub-scan direction over which the electric signal
25 exceeds a predetermined threshold value;

a second detection step of detecting a flat portion of the read signal within the range detected at said

first detection step; and

a setting step of setting the center of the flat portion, which has been detected at said second detection step, as a reading position.

5 26. The method according to claim 25, wherein the threshold value is decided based upon a maximum value of the electric signal output by the photoelectronic converter.

27. The method according to claim 26, wherein a value,
10 which is obtained by multiplying the maximum value of the electric signal output by the photoelectronic converter by a predetermined coefficient, is adopted as the threshold value.

28. The method according to claim 26, wherein the
15 threshold value is decided based upon the maximum value of the electric signal, which is output by the photoelectronic converter, when said maximum value is greater than a predetermined value.

29. The method according to claim 28, further
20 comprising a step of outputting an error signal when the maximum value of the electric signal output by the photoelectronic converter is equal to or less than the predetermined value.

30. The method according to claim 25, wherein the
25 reading position is set at said setting step when the range in the sub-scan direction over which the predetermined threshold value is exceeded is broader

than a predetermined range.

31. The method according to claim 30, further comprising a step of outputting an error signal when the range in the sub-scan direction over which the

5 predetermined threshold value is exceeded is narrower than the predetermined range.

32. The method according to claim 25, further comprising the following steps executed before said read-out step:

10 a step of moving said document reading unit and causing the photoelectronic converter to output an electric signal at each position to which the document reading unit is moved; and

a step of detecting a position in the sub-scan
15 direction that corresponds to the maximum value of this electric signal;

wherein processing is executed at said read-out step with regard to a predetermined range the center of which is the obtained position in the sub-scan
20 direction.

33. A computer program product comprising a computer-usable medium having computer-readable program code means embodied in said medium for a reading position setting method in an image reading apparatus for moving
25 a document reading unit to a point below a document feeder that feeds documents, and emitting light from a light source of the document reading unit toward a feed

roller of the document feeder, whereby light reflected from a document that travels between the feed roller and the light source is converted to an electric signal by a photoelectronic converter to thereby read an image on the document, said product including:

first computer-readable program code means for moving the document reading unit, irradiating the feed roller with light from the light source at each position to which the document reading unit is moved and causing said photoelectronic converter to output an electric signal that conforms to amount of light reflected from the feed roller at each position;

second computer-readable program code means for detecting a range in a sub-scan direction over which the electric signal exceeds a predetermined threshold value; and

third computer-readable program code means for setting a position at the center of the detected range as a reading position.

34. A computer program product comprising a computer-usable medium having computer-readable program code means embodied in said medium for a reading position setting method in an image reading apparatus for moving a document reading unit to a point below a document feeder that feeds documents, and emitting light from a light source of the document reading unit toward a feed roller of the document feeder, whereby light reflected

from a document that travels between the feed roller and the light source is converted to an electric signal by a photoelectronic converter to thereby read an image on the document, said product including:

5 first computer-readable program code means for moving the document reading unit, irradiating the feed roller with light from the light source at each position to which the document reading unit is moved and causing said photoelectronic converter to output an electric
10 signal that conforms to amount of light reflected from the feed roller at each position;

 second computer-readable program code means for detecting a range in a sub-scan direction over which the electric signal exceeds a predetermined threshold value;

15 third computer-readable program code means for detecting a flat portion of the read signal within the detected range; and

 fourth computer-readable program code means for setting the center of the detected flat portion as a
20 reading position.